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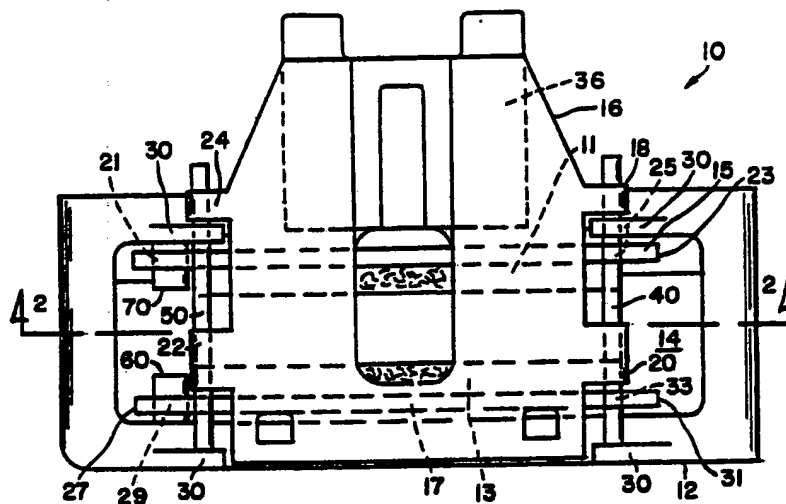
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(21) International Application Number: PCT/US91/00548 (22) International Filing Date: 25 January 1991 (25.01.91) (30) Priority data: 482,370 20 February 1990 (20.02.90) US (71) Applicant: ALLIED-SIGNAL INC. [US/US]; Law Department (C.A. McNally), P.O. Box 2245R, Morristown, NJ 07962-2245 (US). (72) Inventor: BEHRMANN, Edgar, Anthony ; 2725 Portage Road, Niles, MI 49120 (US). (74) Agent: ROONEY, Gerard, P.; Allied-Signal Inc., Law Department (C.A. McNally), P.O. Box 2245R, Morristown, NJ 07962-2245 (US).		(81) Designated States: AT (European patent), AU, BE (European patent), CA, CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (European patent), GB (European patent), GR (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), SE (European patent). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> <i>No U.S.-patent equivalent</i>

(54) Title: **DISC BRAKE WITH PIN GUIDED CALIPER**



(57) Abstract

The disc brake (10) comprises a caliper (16) supported by pins (40, 50) on a torque support member (12). The torque support member (12) includes at one side of a central opening (14) a pair of axially extending extensions (60, 70) which extend axially toward one another. The friction members (11, 13) each include backing plates (15, 17) having at one side an annular opening (21, 29) and at the opposite side a recess opening (25, 33). The annular opening (21, 29) of each backing plate (15, 17) receives a respective axially extending extension (60, 70) and the oppositely disposed recess opening (25, 33) in the backing plate (15, 17) receives one (40) of the pins (40, 50). The friction members (11, 13) are anchored relative to the torque support member (12) and are able to slide axially for braking and to compensate for friction lining wear.

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DISC BRAKE WITH PIN GUIDED CALIPER

The present invention relates generally to disc brakes, and in particular to a pin supported caliper which displaces friction members supported by the torque support member.

5 Numerous disc brakes have been provided previously. Certain disc brakes may suffer generally from one or more of the following problems. If the caliper is suspended on pins at one side of the rotor, braking forces can cause the caliper to twist and distort which effects uneven loading on the brake shoes. Shoe
10 guided caliper designs are generally not well suited for heavy duty usage. The spring clips utilized to keep the caliper in position tend to be troublesome. Calipers which have large contact surfaces and/or close tolerance fits with the anchor or torque support member develop
15 sliding problems as corrosion builds up on the surfaces. It is highly desirable to provide a disc brake which eliminates the above problems.

The present invention provides a solution to the above problems by providing a disc brake, comprising a
20 torque support member having an opening receiving a caliper, the support member having at least one pin extending axially thereacross and received in complementary-shaped opening means of the caliper in order to support slideably the caliper upon the support
25 member, at least one friction member disposed within said opening, the torque support member having at one side of said opening an axially extending member, the friction member including a backing plate having at one side a first opening and on the other side an oppositely
30 disposed second opening, the axially extending member of the torque support member received within the first opening of the backing plate and the second opening receiving therein said pin in order to support the friction member relative to the torque support member and
35 caliper.

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On way of carrying out the invention is described in detail below with reference to the drawings which illustrate an embodiment in which:

Figure 1 is a top view of the disc brake of the present invention;

Figure 2 is a side view of the disc brake of the present invention;

Figure 3 is a top view of the caliper;

Figure 4 is a side view of the caliper;

Figure 5 is a top view of the torque support member;

Figure 6 is a side view of the torque support member; and

Figure 7 is a side view of the inner friction member utilized in the disc brake of the present invention.

The disc brake of the present invention is indicated generally by reference numeral 10 in Figure 1. Disc brake 10 includes a torque support member 12 having therein a central opening 14. The central opening 14 receives therein a caliper 16. Caliper 16 includes circumferentially extending extensions 18, 20, 22, and 24 (see Figures 3 and 4). Each circumferentially extending extension includes a recess 26 for slideably supporting the caliper relative to the torque support member 12. The torque support member 12 includes axially spaced apart portions 30 each of which includes an opening 32. Received fixedly within openings 32 are pins 40 and 50. Pin 40 is received within caliper openings 26 of extensions 18 and 20 while pin 50 is received within caliper openings 26 of extensions 22 and 24 (see Figure 4), such that caliper 16 is supported slideably relative to torque support member 12. Torque support member 12 includes axial extensions 60 and 70 which extend axially toward one another within central opening 14.

Disc brake 10 includes an inner friction member 11 and an outer friction member 13. Inner friction member 11 includes a backing plate 15 and outer friction

member 13 includes a backing plate 17. Friction member 11 is illustrated in Figur 7 and includes within backing plate 15 a circumferential ear 19 which includes annular opening 21 that receives axial extension 70 (see Figure 1). An oppositely disposed circumferential ear 23 includes a recess opening 25 which opens toward circumferential ear 19 and receives pin 40. In similar manner, outer friction member 13 includes an annular opening 29 in circumferentially extending ear 27 that receives axial extension 60 and a recess opening 33 in opposite circumferentially extending ear 31 (see Figure 1) which receives pin 40. Referring to Figure 2, pin 40 may include thereabout a plastic sleeve member 42.

Caliper 16 includes a brake motor 36. As is well-known within the art, when brake motor 36 (the motor being operable either by hydraulic braking pressure or any other suitable device for effecting displacement of a piston type member within motor 36) is actuated by the vehicle operator, the piston member extends axially to engage inner friction member 11 and cause friction member 11 to engage the rotating rotor 46 (see Figure 2). In reaction to the inner friction member engaging rotor 46, the caliper moves toward an inboard direction which causes the outer arm 16a (Figures 2 and 4) to engage the outer friction member 13 and displace it into engagement with the other side of the spinning rotor 46. As a result, the rotor is engaged on both sides by friction members 11, 13 and braking of the associated vehicle is effected.

The disc brake of the present invention provides substantial advantages in that no twisting forces are imposed on the caliper by the pins 40 and 50. Caliper 16 is free to slide axially with the friction members 11 and 13. Braking forces imposed on the friction members 11 and 13 are imposed uniformly and these forces are transmitted directly to support member 12 via the axial extensions 60 and 70. Thus, there is a potential for a

qui t r perating disc brake. Caliper 16 is r strained
positiv ly against displacement from t rqu support
member 12 by means of pins 40 and 50, so that brake 10
can be utilized in heavy duty applications. Spring clips
5 can keep the caliper from effecting klunking noises
during braking. The disc brake of the present invention
provides sufficient clearance between caliper 16 and pins
40, 50 so that corrosion does not inhibit caliper
movement. Because the loads imposed upon the pins 40, 50
10 would be relatively low, plastic sleeves such as sleeve
42 (see Figure 2) can be utilized about either one or
both pins to further reduce the effects of corrosion.
Trailing friction members or brake shoes are utilized,
thus the brake may provide a quieter operating brake.
15 The friction members 11, 13 are mounted by means of the
annular openings 21, 29 to the axial extension 60, 70 on
torque support member 12. Deflections of the support
member 12 would not cause any loading or twisting of the
friction members. The caliper and support member
20 configurations are symmetrical castings. As a result, a
caliper with three point mounting (i.e. non-symmetrical)
can also be utilized. Additionally, the caliper and
torque support member configurations lend themselves to
easy redesigning so that on one side of central opening
25 14 a pin 40 or 50 could be eliminated and an interlocking
feature between the support member and caliper
implemented, all without affecting the function of the
brake.

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CLAIMS

1. A disc brake, comprising a torque support member (12) having an opening (14) receiving a caliper (16), the support member (12) having at least one pin (40) extending axially thereacross and received in complementary-shaped opening means (26) of the caliper (16) in order to support slideably the caliper (16) upon the support member (12), at least one friction member (11, 13) disposed within said opening (14), the torque support member (12) having at one axial side of said opening (14) an integral and axially extending stub member (60, 70) which extends axially only partially into the opening (14), the friction member (11, 13) including a backing plate (15, 17) having at one circumferential end (19, 27) a first opening (21, 29) and at the other circumferential end (23, 31) an oppositely disposed second opening (25, 33), the axially extending stub member (60, 70) of the torque support member (12) received within the first opening (21, 29) of the backing plate (15, 17) and the second opening (25, 33) receiving therein said pin (40) in order to support the friction member (11, 13) relative to the torque support member (12) and caliper (16).

2. The disc brake in accordance with Claim 1, further comprising a second pin (50) disposed on one side of the opening (14) of the support member (12) and opposite the one pin (40), the second pin (50) received within second complementary-shaped opening means (26) of the caliper (16) in order to support the caliper (16) slideably relative to the torque support member (12).

3. The disc brake in accordance with Claim 2, wherein the first pin (40) includes a plastic sleeve (42) thereabout.

4. The disc brake in accordance with Claim 3, further comprising a second friction member (11, 13)

which includes a backing plate (15, 17) having a respective first opening (21, 29) and opposite second opening (25, 33), the torque support member (12) having a second axially extending stub member (60, 70) extending toward the other axially extending stub member (60, 70) and received within the first opening (21, 29) of the second friction member (15, 17), the second pin (50) received within the second opening (25, 33) of the backing plate (15, 17) of the second friction member (11, 13).

5. The disc brake in accordance with Claim 4, wherein the caliper (16) comprises a circumferentially extending upper section having at opposite ends thereof the respective complementary-shaped opening means (26) each of which receives therein the respective pin (40, 50).

6. The disc brake in accordance with Claim 4, wherein each of the second openings (25, 33) comprises a recess (25, 33) that opens toward the respective first opening.

7. The disc brake in accordance with Claim 6, wherein the torque support member (12) includes radially extending portions (30) each with a hole (32) that receives an end of a respective pin (40, 50).

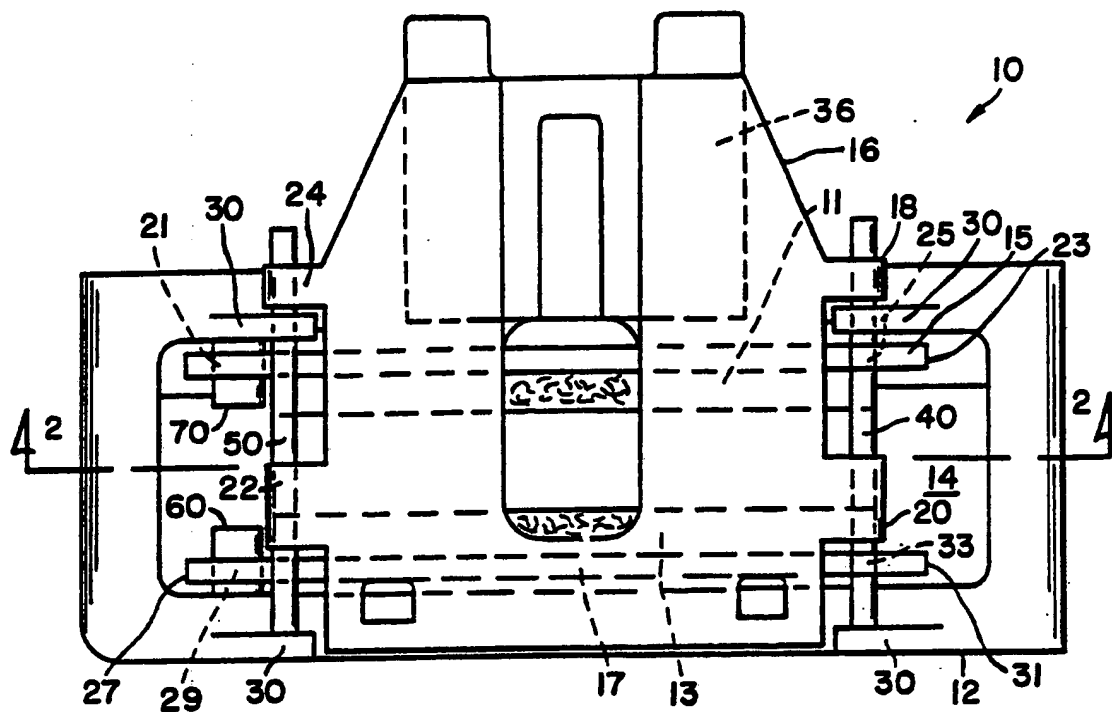


FIG. 1

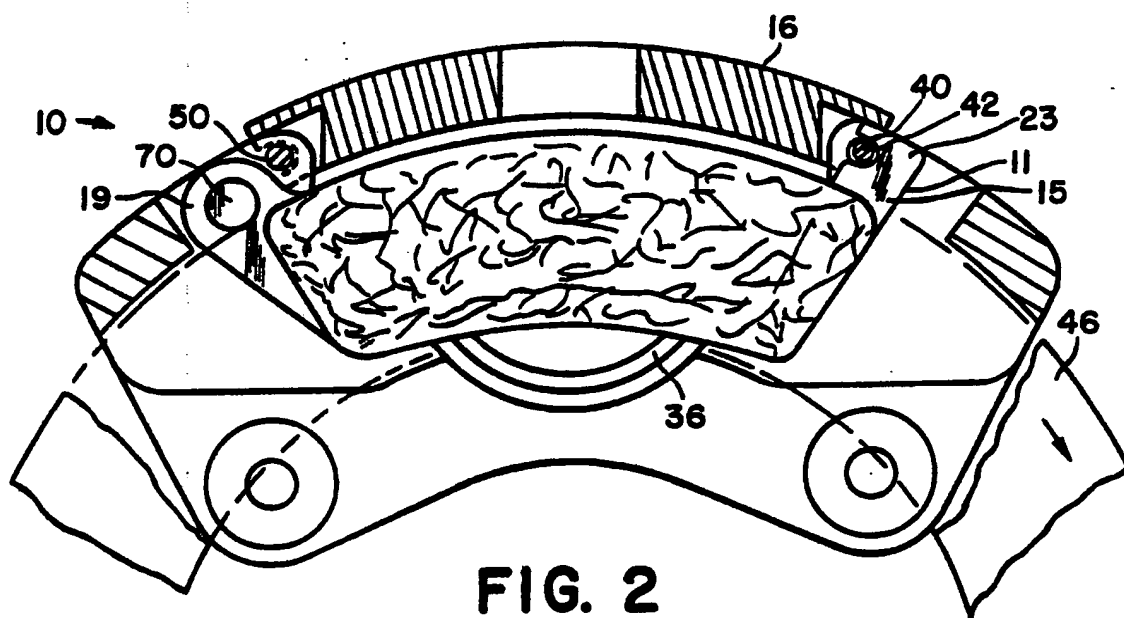


FIG. 2

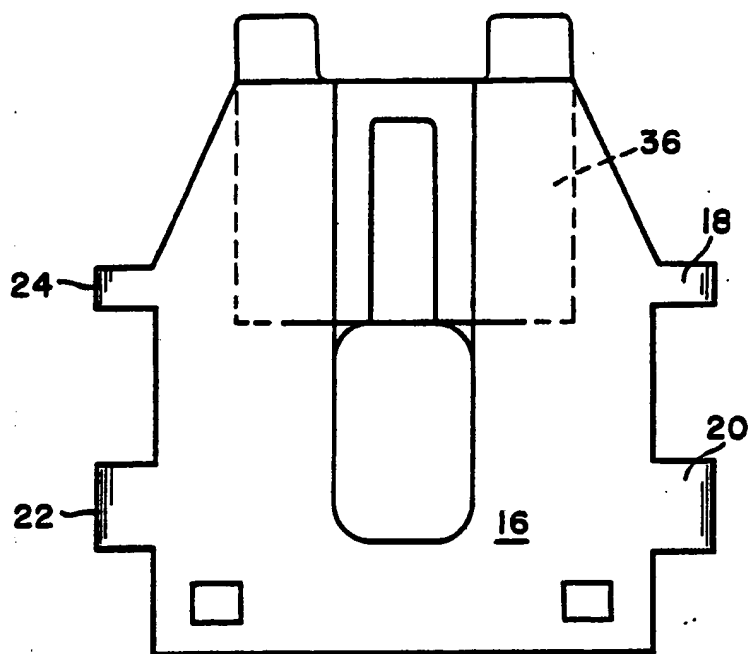


FIG. 3

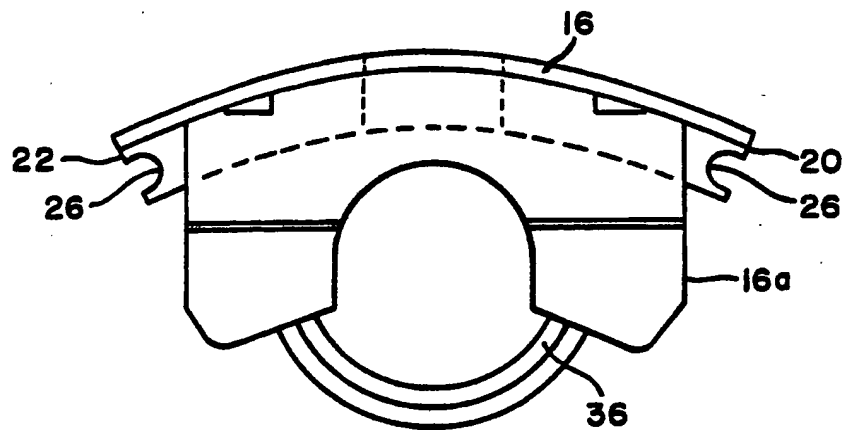


FIG. 4

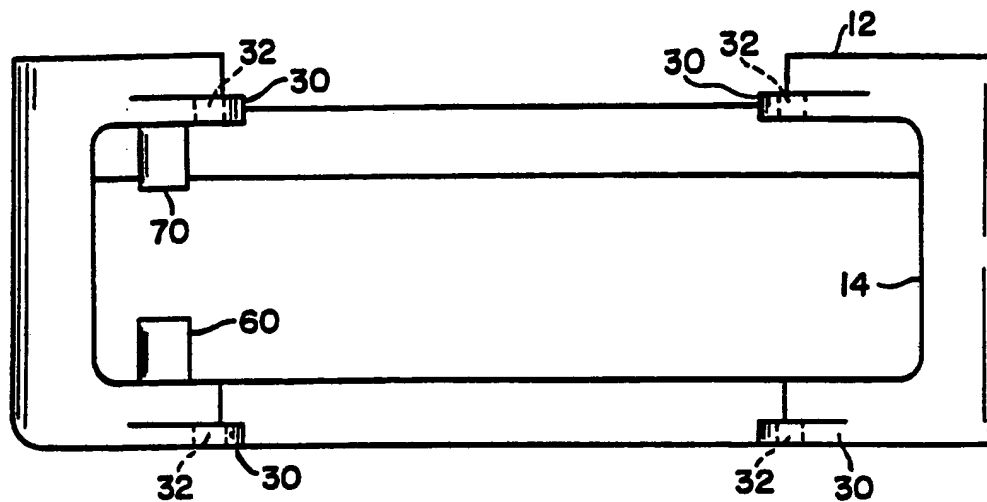


FIG. 5

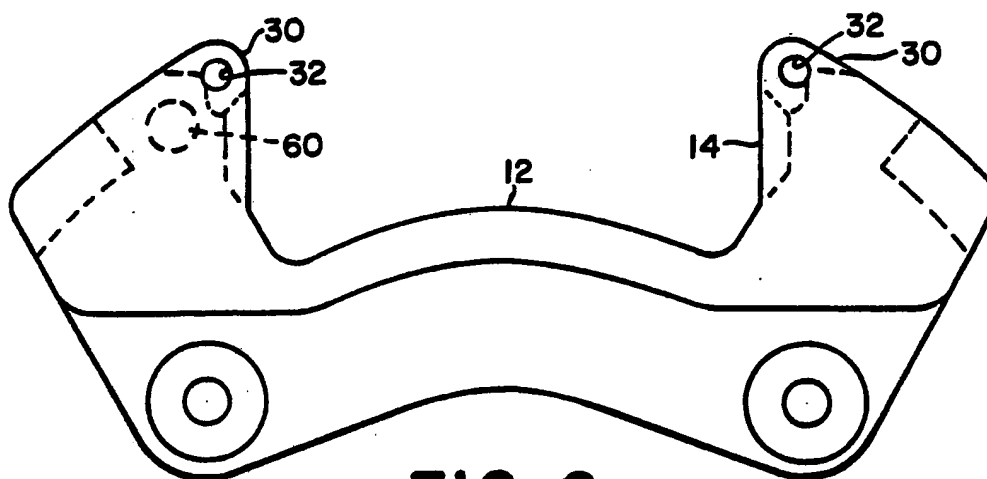


FIG. 6

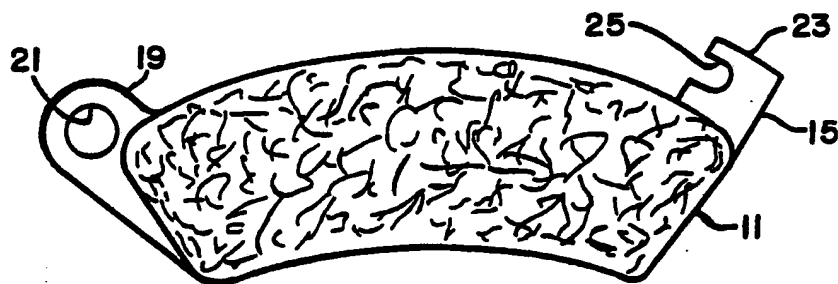



FIG. 7

INTERNATIONAL SEARCH REP RT

International Application No PCT/US 91/00548

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ⁸		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC ⁵ : F 16 D 55/226, 65/02		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
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IPC ⁵	F 16 D 55/00, 65/00	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category ⁶	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	GB, A, 1175789 (GENERAL MOTORS CORP.) 23 December 1969 see figure 1 --	1,2
A	EP, A, 0242694 (LUCAS INDUSTRIES PUBLIC LTD CO.) 28 October 1987 see figure 1 --	1,4
A,P	EP, A, 0357469 (BENDIX FRANCE SOCIETE ANONYME DITE:) 7 March 1990 see column 3, lines 61-65; figures 1,2,4 -----	1,5
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>¹⁰ Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"A" document member of the same patent family</p> </div> </div>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
3rd June 1991		22 JUL 1991
International Searching Authority		Signature of Authorized Officer
EUROPEAN PATENT OFFICE		 MISS J. TAFELAAR

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**ANNEX TO THE INTERNATIONAL SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 12/07/91
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB-A- 1175789	23-12-69	FR-A- 1577834	08-08-69
		US-A- 3628639	21-12-71
EP-A- 0242694	28-10-87	DE-U- 8610698	13-08-87
		JP-A- 62255626	07-11-87
		US-A- 4747472	31-05-88
EP-A- 0357469	07-03-90	FR-A- 2635842	02-03-90
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